Amendments to the Claims

This listing of claims will replace all prior versions and listings of the claims in this application.

Listing of Claims

1. (Currently amended) A medical pump for use with a pumping chamber, comprising:

a pumping element adapted to intermittently pressurize the pumping chamber during a pumping cycle;

a pressure sensor directly connected to the pumping element and adapted to detect the pressure exerted by the pumping element on the pumping chamber;

a position sensor operatively associated with the pumping element to detect the position of the pumping element throughout the pumping cycle;

a processing unit in electronic communication with the pressure sensor and position sensor; and

a memory coupled to the processing unit, wherein the memory contains programming code executed by the processing unit to process pressure data from the pressure sensor and position data from the position sensor to determine a calculated stroke volume of the pump for a pumpthe pumping cycle, and to adjust a stroke frequency of the pump to compensate for variation between the calculated stroke volume and a desired dosage rate; and

wherein the pumping chamber has a passive outlet valve operated by the pressure exerted by the pumping element on the pumping chamber, and the programming code executed by the processing unit processes pressure data from the pressure sensor to identify when the outlet valve has opened.

2. (Original) The medical pump of claim 1, wherein the pressure sensor is the only pressure sensor included in the medical pump.

3. - 6. (Cancelled)

7. (Currently amended) The medical pump of claim 1, wherein the programming code executed by the processing unit sets athe stroke frequency for the desired dosage rate based

on a nominal stroke volume, and adjusts the stroke frequency to compensate for variation between the calculated stroke volume and the nominal stroke volume.

8. (Cancelled)

9. (Currently amended) The medical pump of claim 8~~1~~, wherein the programming code executed by the processing unit processes pressure data and position data to determine a calculated pressurization volume from a beginning of a compression stroke of the ~~pump~~pumping cycle to the point when the outlet valve opens, and uses the calculated pressurization volume to determine the calculated stroke volume.

10. (Currently amended) The medical pump of claim 9, wherein the programming code executed by the processing unit determines a change in pressurization volume by subtracting the calculated pressurization volume from a nominal pressurization volume, determines a change in stroke volume by multiplying the change in pressurization volume by a ratio of pumping chamber expansion under pressure at the ~~middle of the pumping cycle~~end of the compression stroke~~ ~~to pumping chamber expansion under pressure at the ~~start~~beginning of the compression stroke of the pumping cycle, and determines the calculated stroke volume based on the change in stroke volume.

11. (Original) The medical pump of claim 1 further comprising a cassette for defining the pumping chamber.

12. (Original) The medical pump of claim 1, wherein the calculated stroke volume comprises multiple calculated stroke volumes averaged together.

13. – 22. (Cancelled)

23. (Currently amended) A medical pump for use with a pumping chamber, comprising:
a pumping element adapted to intermittently pressurize the pumping chamber during a
        pumping cycle;
a pressure sensor adapted to detect the pressure exerted by the pumping element on the
        pumping chamber;

a position sensor operatively associated with the pumping element to detect the position of

the pumping element;

a processing unit in electronic communication with the pressure sensor and position sensor;

and

a memory coupled to the processing unit, wherein the memory contains programming code

executed by the processing unit to process pressure data from the pressure sensor and

position data from the position sensor to:

set a stroke frequency for a desired dosage rate based on a nominal stroke volume,

~~determine~~identify by a slope change in the pressure data when an outlet valve of the

pumping chamber has opened~~opens~~,

determine a calculated pressurization volume from a beginning of the ~~pump~~pumping

cycle to the point when the outlet valve opens,

determine a change in pressurization volume by subtracting the calculated

pressurization volume from a nominal pressurization volume,

determine a change in stroke volume by multiplying the change in pressurization

volume by a ratio of pumping chamber expansion under pressure at the

~~middle~~end of the compression stroke of the pumping cycle to pumping

chamber expansion under pressure at the ~~start~~beginning of a compression

stroke of the pumping cycle,

determine a calculated stroke volume based on the change in stroke volume, and

adjust the stroke frequency to compensate for variation between the calculated stroke

volume and the nominal stroke volume; and

wherein the outlet valve of the pumping chamber is a passive valve operated by the pressure

exerted by the pumping element on the pumping chamber.

24. (Original) The medical pump of claim 23 further comprising a cassette for defining the

pumping chamber.

25. (Currently amended) A medical pump for use with a cassette having a pumping chamber,

comprising:

a pumping element adapted to intermittently pressurize the pumping chamber during a

pumping cycle;

a pressure sensor adapted to detect the pressure exerted by the pumping element on the
pumping chamber;

a position sensor operatively associated with the pumping element to detect the position of
the pumping element;

a processing unit in electronic communication with the pressure sensor and position sensor;
and

a memory coupled to the processing unit, wherein the memory contains programming code
executed by the processing unit to process pressure data from the pressure sensor and
position data from the position sensor to determine a calculated stroke volume of the
pump for ~~a pump~~the pumping cycle, and to adjust a stroke frequency of the pump to
compensate for variation between the calculated stroke volume and a desired pump
flow rate; and

wherein the pumping chamber has a passive outlet valve operated by the pressure exerted by
the pumping element on the pumping chamber, and the programming code executed
by the processing unit processes pressure data from the pressure sensor to identify
when the outlet valve has opened.

26. – 30. (Cancelled)

31. (New) The medical pump of claim 10, wherein the nominal pressurization volume
comprises multiple nominal pressurization volumes averaged together.